

Please add the following new claims:

45. (New) An apparatus for forming a thin film on a substrate, the apparatus comprising:

a multi-functional chamber configured to deposit a dielectric layer on the substrate and configured to oxygen radical or plasma anneal one or more electrode and/or dielectric layers on the substrate, said multi-functional chamber comprising:

a support plate configured to hold the substrate;

a heater unit positioned under the support plate;

a source dispersion device positioned above the support plate and configured to uniformly disperse organic source liquid; and

a source supplier in fluid communication with the source dispersion device, said source supplier comprising:

an organic liquid source;

a liquid mass flow controller configured to control a flow of organic source liquid;

an evaporator in fluid communication with the flow controller and configured to evaporate the source liquid; and

a transfer gas source in fluid communication with the evaporator and configured to transfer an organic source from the evaporator to the source dispersion device;

an oxygen radical or plasma annealing unit connected to the multi-functional chamber and configured to provide oxygen radical or plasma gas to the multi-functional chamber to oxygen radical or plasma anneal one or more electrode and/or dielectric layers on the substrate in the multi-functional chamber, said oxygen radical or plasma annealing unit comprising a gas source selected from the group consisting of O₂, NH₃, Ar, N₂, and N₂O; and

a cleaning gas supplier in fluid communication with the multi-functional chamber and configured to supply cleaning gas to remove dielectric material from a wall of the multi-functional chamber.

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46. (New) The apparatus according to claim 45, further comprising:
a loadlock chamber configured to introduce the substrate into the apparatus; and
a transfer chamber connected to the loadlock chamber and configured to transfer the substrate from a first chamber to a second chamber, wherein the multi-functional chamber is connected to the transfer chamber.

47. (New) The apparatus according to claim 46, further comprising an electrode deposition chamber connected to the transfer chamber.

48. (New) The apparatus according to claim 46, further comprising a crystallization annealing chamber connected to the transfer chamber.

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49. (New) The apparatus according to claim 46, further comprising an oxygen radical or plasma annealing chamber configured to pre-treat a lower electrode and connected to the transfer chamber.

50. (New) The apparatus according to claim 46, further comprising:
a cooling chamber connected to the transfer chamber; and
a pre-heating chamber connected to the transfer chamber.

51. (New) An apparatus for forming a thin film on a substrate, the apparatus comprising:

means for forming a lower electrode on a substrate;
means for forming a dielectric layer on the lower electrode;
means for oxygen radical or plasma annealing the dielectric layer; and
means for forming an upper electrode on the oxygen radical or plasma annealed dielectric layer.

52. (New) The apparatus of claim 51, wherein the means for forming a dielectric layer and the means for oxygen radical or plasma annealing the dielectric layer are in the same

chamber.

53. (New) The apparatus of claim 51, wherein the means for oxygen radical or plasma annealing the dielectric layer is a means for oxygen radical annealing the dielectric layer, and wherein the means for oxygen radical annealing the dielectric layer comprises a means for exposing the dielectric layer to an atmosphere comprising an oxygen radical.

54. (New) The apparatus of claim 53, wherein the means for oxygen radical annealing the dielectric layer further comprises a means for maintaining the temperature of the dielectric layer equal to or less than 500°C.

55. (New) The apparatus of claim 53, wherein the oxygen radical is ozone.

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56. (New) The apparatus of claim 51, wherein the means for oxygen radical or plasma annealing the dielectric layer is a means for plasma annealing the dielectric layer, and wherein the means for plasma annealing the dielectric layer comprises a means for exposing the dielectric layer to an atmosphere comprising a plasma gas selected from the group consisting of O₂, NH₃, Ar, N₂, and N₂O.

57. (New) The apparatus of claim 56, wherein the means for plasma annealing the dielectric layer further comprises the step of maintaining the temperature of the dielectric layer equal to or less than 500°C.

58. (New) The apparatus of claim 51, wherein the dielectric layer consists of a material selected from a group consisting of Ta₂O₅, Al₂O₃, TiO₂, Y₂O₃, SrTiO₃, BaTiO₃, SrTiO₃, PbZrTiO₃, SrBi₂Ta₂O₉, PbZrO₃, LaZrO₃, PbTiO₃, LaTiO₃, and Bi₄Ti₃O₁₂.

59. (New) The apparatus of claim 51, further comprising a means for oxygen radical or plasma annealing the lower electrode.

60. (New) The apparatus of claim 59, wherein the means for oxygen radical or plasma annealing the lower electrode, the means for depositing the dielectric layer, and the means for oxygen radical or plasma annealing the dielectric layer are in the same chamber.

61. (New) The apparatus of claim 59, wherein the means for oxygen radical or plasma annealing the lower electrode, the means for forming the dielectric layer, the means for oxygen radical or plasma annealing the dielectric layer, and the means for forming the upper electrode are within a single apparatus for forming a thin film.

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62. (New) The apparatus of claim 59, further comprising a means for crystallization annealing the dielectric layer.

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63. (New) The apparatus of claim 62, wherein the means for oxygen radical or plasma annealing the lower electrode, the means for forming the dielectric layer, the means for oxygen radical or plasma annealing the dielectric layer, the means for forming the upper electrode, and the means for crystallization annealing the dielectric layer are within a single apparatus for forming a thin film.

64. (New) The apparatus of claim 51, further comprising a means for crystallization annealing the dielectric layer.

65. (New) The apparatus of claim 64, wherein the means for oxygen radical or plasma annealing the dielectric layer and the means for crystallization annealing the dielectric layer are in the same chamber.

66. (New) The apparatus of claim 64, wherein the means for forming the dielectric layer, the means for oxygen radical or plasma annealing the dielectric layer, the means for crystallization annealing the dielectric layer, and the means for forming the upper electrode are within a single apparatus for forming a thin film.